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ESTABLISHMENT OF A METHODOLOGY FOR DETERMINATION OF CARRYING CAPACITY FOR THE INDIAN PEAKS WILDERNESS

by

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ABSTRACT

Carrying capacity for the Indian Peaks Wilderness Area in the Arapaho and Roosevelt National Forests can be estimated in a relatively simple manner. Data representing various aspects of the social and physical-biological elements of wilderness can be analyzed relevant to established management objectives to estimate a reasonable and defensible wilderness carrying capacity.

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CHAPTER I

INTRODUCTION AND STATEMENT OF PROBLEM

INTRODUCTION

"The 72,662 acre Indian Peaks Wilderness is located along the Continental Divide about 25 miles west of Boulder, Colorado. It is adjacent to Rocky Mountain National Park on the north, and the Arapaho National Recreation Area on the west. The area contains a number of peaks reaching above 13,000 feet and has several prominent snowfields and remnant glaciers. Over a third of the area lies above treeline. Lower elevations on both sides of the Divide contain dense spruce-fir forest and numerous perennial streams. At least 40 alpine lakes and four manmade reservoirs are within the area. Most are above 10,000 feet in elevation.

Access to the Indian Peaks Wilderness is by Colorado Highway 119 from Boulder and at several points along Colorado Highway 7 (Peak to Peak Highway). Access can also be gained from the Rollins Pass (Moffat) Road from East Portal. On the west side, the major access is at Monarch Lake in the Arapaho National Recreation Area. In all, there are 17 Wilderness entry points." (Rupp, 1979).

The Indian Peaks area has been utilized for primitive outdoor recreational activities since the early 1800's. Its close proximity to the Denver Metropolitan-Colorado Front Range made it very popular for those

wishing a short escape from the pressures of city life. "From 1972 to 1976, there was tremendous population growth in the Fort Collins-Boulder-Denver area. In the same time span, there was a growing national and local interest in primitive recreation. This was expressed by increasing use of the Indian Peaks, one of the few backcountry areas close to this swelling population."

On October 11, 1978, P. L. 95-450 formally established the Indian Peaks Wilderness area, and, since then, this unit of the Wilderness Preservation System has continued to experience increased use. This heavy use has led to increasing amounts of resource damage, exhibited in compacted soil and erosion, and reduced vigor or loss of overstory vegetation, especially at popular campsites, and around the shores of the more easily accessible lakes. The trail system is also exhibiting evidence of accelerated deterioration in the form of tread erosion and vegetation damage through expanding trail width and multiple, parallel trails. Multiple trails have created an adverse visual impact and a confusing situation for the public. (Rupp, 1979). Large numbers of people in the wilderness at one time have also had an adverse effect on opportunities for solitude in some areas. On a typical summer weekend day, there will be as many as 900 to 1000 people in the South St. Vrain unit of the area, a density as high as .3 to .5 people per acre at one time. Attempts to mitigate and reduce impacts of large numbers of people by visitor education have had varying degrees of success. On the west side of the Wilderness, where the access portals are further from population centers, and, therefore average only 15 to 20 percent of that on the East side, visitor

education efforts have been very successful. There are only four entry points on the west side of the Indian Peaks, and 90 percent of the users enter at one, Monarch Lake. The Wilderness Information Station at Monarch Lake has been a very effective contact point. When funding has allowed it to be adequately manned, nearly 80 percent of all visitors entering the west side have been personally contacted by Forest Service personnel. On the east side of the Wilderness, attempts at visitor education have been much less successful. Thirteen trailheads, with easy access, close to large population centers, have made education efforts hit and miss at best. User volume and the number of highly used trailheads present a formidable obstacle to an individual information contact program.

As part of the Draft Land and Resource Management Plan for the Arapaho and Roosevelt National Forests, an Area Specific Implementation Program for the Indian Peaks Wilderness was prepared. This Implementation Program is the combination of analysis inventories, research, and input from a wide range of public and private organizations whose involvement has been ongoing since the early 1970's.

The Area Specific Implementation Program is designed to achieve the following Forest Plan goals for the Wilderness:

--Maintain Wilderness use within the capacity of the area to sustain use.

--Prevent further decline in physical and biological resource conditions and reduce user conflicts.

--Increase visitor awareness and improve behavior related to maintenance of wilderness values.

--Restore unacceptable physical and biological impacts of past use.

--Enhance social wilderness values including increased opportunities for solitude and primitive, unconfined recreation.

Prioritized Management Direction in the Implementation Program lists the following general direction statement as first priority for implementation:

"Development of comprehensive, long range, controls over visitor use and modified management of peripheral visitor facilities would take priority over short range solutions involving additional on-site visitor regulation and enforcement. With limited budgets, continuation of emphasis on on-site regulation and enforcement would not release the necessary funds and manpower to develop the data and skills needed to implement long range solutions."

The more specific Management Direction statements list as "Priority 1: Limit use within carrying capacity by implementing a permit system with entry quotas."* The Implementation Program makes a rough determination of upper limits of carrying capacity, based on application of coefficients

*Area Specific Implementation Program--Indian Peaks Wilderness (Appendix C)

contained in the management prescriptions for wilderness in the Draft Forest Plan. Prior to implementation of a permit system that utilizes entry quotas, more refined carrying capacities must be estimated.

STATEMENT OF THE PROBLEM

A large amount of research has been conducted in the past thirty years on recreation carrying capacity. A significant number of these studies have dealt with wilderness carrying capacity. However, most of the work has centered on the need to establish carrying capacities, or has attempted to define it. Specific recommendations on methods useable by the manager to actually establish carrying capacity numbers are lacking.

The purpose of this study is to recommend a specific methodology to be used on the Arapaho and Roosevelt National Forests to establish estimated carrying capacity figures for the Indian Peaks Wilderness Area in sufficient detail to support a program of use limitation.

HYPOTHESIS

It is anticipated that a relatively simple method, utilizing data either presently available or easily gathered during the 1983 field season, can be devised to determine carrying capacity for the Indian Peaks Wilderness Area.

LIMITATIONS

This study will not attempt to deal with the aspects of recreational livestock use, use by large groups, outfitter-guide use or day use. The carrying capacity for recreation livestock users must be based on range analysis and identification of campsites suitable for such use. Policies for large group use and outfitter-guide operations will have to be developed based on suitable campsites. Some aspects of day use carrying capacity can be estimated utilizing the methodology recommended by this study. However, further analysis will most likely be required to establish meaningful estimates. These components of the overall carrying capacity must be considered and melded into the results derived by the methodology recommended in this study, prior to establishing final entry quotas.

CHAPTER II

REVIEW OF LITERATURE

A large amount of research work has been dedicated to the subject of recreation carrying capacities. Stankey and Lime (1973) listed over 200 publications that deal with the subject, and much was published in the following ten years.

A significant majority of the authors agree that the concept of recreation carrying capacity is extremely complex. It deals with aspects and principles of the physical, biological, and social sciences. (Lime, 1975). There is almost universal agreement that carrying capacity figures cannot be established precisely and, at best, must be estimates based on the land manager's experience and best judgment. Researchers also agree that in establishing recreation carrying capacity figures, managers must: 1) establish management objectives, 2) consider social aspects, and 3) consider the impacts on the physical and biological environment. These same premises are found in the literature that deals specifically with wilderness carrying capacity.

Most researchers and wilderness managers agree with Lime, defining carrying capacity as: "The amount and character of use an area can sustain within a specified time period without causing unacceptable change to the physical environment or to the experience of the user." (Lime, 1975). Within this definition, the following literature review will cite the

significant aspects of the three major components of the wilderness carrying capacity concept: 1) Management objectives; 2) Social aspects/ solitude; 3) Impacts on the physical and biological environment.

MANAGEMENT OBJECTIVES

The overriding goals that must be kept uppermost in every wilderness manager's mind, in addressing the establishment of carrying capacity for wilderness, is the Wilderness Act of 1964 (P. L. 88-577). These goals are summarized in the section of the Act titled "Definition of Wilderness." Briefly, these are: 1) ". . . An area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." 2) ". . . an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions. . ." 3) It "generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable." 4) It "has outstanding opportunities for solitude or a primitive and unconfined type of recreation." All management objectives for wilderness must be subordinate to these goals.

Stankey and Lime point out that, "capacity can only be judged in light of the particular management objectives for a given area." (Lime and Stankey, 1971). In a paper presented at the annual meeting of the Society of American Foresters in 1972, at Hot Springs, Arkansas, Frissell and Stankey emphasized that management objectives have two important

functions in establishing carrying capacity. They 1) define what should be protected in an area, and provide the criteria against which decisions regarding capacity are judged; and 2) define the kinds of alternatives available to the manager. (Frissell and Stankey, 1972).

In 1975, Lime was more explicit in refining the role of management objectives. He suggests that two types be utilized: 1) "Broad objectives influenced or controlled by enabling legislation and general administration policy; 2) explicit objectives that delineate the desired environmental setting to be sustained and the user experience(s) the area is to produce." (Lime, 1975).

Driver and Brown (1975) define management objectives as, what is to be produced in terms of recreation experience opportunities, and how and where these opportunities are to be managed and sustained. In the Forest Service publication, "Wilderness Management" Hendee, Stankey and Lucas (1978) recommend that wilderness management plans should establish the hierarchy of direction for that wilderness. They feel this hierarchy is 1) the broad, general goals of the Wilderness Act; 2) The Departmental regulations regarding wilderness; 3) Forest Service policy; 4) Clear, concise management objectives which describe desired wilderness conditions to be achieved and/or maintained through management; 5) management mechanisms necessary to achieve the higher level objectives.

Sprague (1979) suggested a modification of Lime's thinking regarding recommended objectives. He felt managers should consider the following when setting objectives:

"1) General-use intensity or level of solitude.

2) Types of use desired (horses or hikers only, group size, or overnight, etc.).

3) Accessibility (trailheads, roads leading to trailheads, and other wilderness entrance points and the attendant road signing).

4) Types of facilities necessary to meet other objectives (trail signs, primitive toilets, etc.).

5) The acceptable levels of change will be permitted for a particular wilderness (i.e., allow trampling damage to vegetation which will recover in two weeks of rest or in one year of rest)."

DeGraff (1980) defines wilderness carrying capacity as, ". . .the amount of human use an area can withstand within prescribed objectives (emphasis added) and not suffer unacceptable impacts." He goes on to state that, by establishing prescribed objectives, the manager sets an "optimum" capacity for an area that allows the user to have a particular experience.

Haas (1982) states that the capacity for wilderness is not a fixed number. It is directly influenced by the goals, objectives and Limits of Acceptable Change Standards for a wilderness or portion of a wilderness.

SOCIAL ASPECTS - SOLITUDE

As early as 1951, farsighted individuals such as John Seiker recognized the effect of crowding on wilderness experiences.

> "It was recognized many years ago that the relatively small area of wilderness in the United States could not withstand the use it was receiving. Saddle and pack stock were limited to the available forage and the capacity of the trails.
>
> "People, too, are limited to the 'wilderness capacity' of the area. This 'wilderness capacity' is not related only to the physical aspects of the area nor to the type of people who used it. It was found that a wilderness just ceased to be wilderness when a certain concentration of wilderness travelers were in it. It is measured by how many parties you meet on the trail, how many camps you pass, and how many people you see on the fishing streams. If you meet too many people--in the wilderness--suddenly that elusive thing called wilderness is gone." (Sieker, 1951).

Sieker's perceptive view of the future was extremely accurate; many studies have been conducted that try to answer the question, how much is too much?

In studies conducted in three wilderness areas in Montana during the early 1960's, Merriam and Ammons concluded that, although the experience differs somewhat from area to area, there is a phenomenon that people

seek called "the wilderness experience," This experience involves roadless undeveloped country and promotes a freedom of opportunity with a minimum of modern technology in evidence. (Merriam and Ammons, 1968).

In 1970, David W. Lime stated that ". . . the determination of carrying capacity is basic to sound wilderness management." He set as his first priority "people research," the determination of the visitor's sensitivity to crowding. Lime's premise was that sensitivity to crowding could actually result in setting capacity levels lower than those allowed by resource considerations. (Lime, 1970).

Perception is important to the social aspect of recreation carrying capacity. The needs and motivations of users vary greatly, and are different from the needs and motivations of managers. In consideration of the social component of carrying capacity, the values of users, as well as the managing agency, must be weighed. Although management cannot rely completely on visitor views, they are valuable in the formulation of alternatives and opportunities. (Lime and Stankey, 1971).

Frissell and Stankey, in their 1972 exploration of the Limits of Acceptable Change theory, state that user perception must be recognized as an important constraint in wilderness preservation decisions. They suggest that the definition of a "pristine wilderness experience" be ". . . encountering no other people on a visit," using this experience as a base, and then, by use of visitor objectives and management objectives, determining at what use the Level of Acceptable Change is exceeded. They also

emphasize the application of user opinion to offset the manager's "biological bias." (Frissell and Stankey, 1972).

In another 1972 publication, Stankey went on to state that ". . . the question of 'the acceptable level of physical-biological change' becomes a problem of defining the critical thresholds of sensitivity of wilderness users to various congestions costs: crowding, environmental change, and so forth." Managers must know how people respond to these costs and how they define their objectives.

Stankey (1972) suggests that ". . . wilderness represents one type of opportunity within a broad spectrum. We should not try to manage the wilderness for all. He defines a "high quality" wilderness experience as a trip in a pristine setting where visitors enjoy complete or near solitude, and suggests that providing a "high quality wilderness experience" is a realistic, pragmatic, management objective.

In reporting on results of interviews conducted on the Middle Fork of the Salmon River, Godfrey and Peckfelder (1973) related that the role of user interactions was even more critical than physical evidence of use. Most of the people interviewed indicated that solitude was a very important attribute of their float trip.

In his 1973 research paper reporting the results of questionnaire completed by nearly 500 visitors to four wildernesses, Stankey reasons that the attitudes of "strong purists" are of particular relevance to management

in making decisions. The results of Stankey's survey show that solitude is "expected" by most purists, and the amount of visitor interaction has an influence on satisfaction. He goes on to state that encounters with large parties had a serious negative effect on user satisfaction, and that the results show that most purists prefer campsites that provide solitude. (Stankey, 1973).

In 1977, Heberlein discussed various aspects of social carrying capacity, defining it as: "How many visitors can be put into an area before the quality of their experience is significantly reduced." Although managers are concerned about social carrying capacity, they are reluctant to limit use based on this alone. He feels this is because there are differences of opinion on what constitutes a high quality recreation experience, and value judgments are required. Social carrying capacity has been determined largely in terms of visitor satisfaction. Heberlein believes that satisfaction is a poor criterion. "It is likely that, for a wilderness experience, the number of visitors may reach the point where the experience is no longer provided, even though there may not be a noticeable reduction in satisfaction of the visitors present."

He recommends the utilization of "Normative Assessment" for establishing social carrying capacity, feeling that, once specific management objectives are set, a visitor assessment should be conducted to determine what actually happens. How often do people actually see each other? Where do they camp? Do they adjust to reduce crowding? Once the manager has this knowledge, then he can contact various users and obtain a sense of the

norms that exist for visitor density in a particular setting, for a particular activity. (Heberlein, 1977).

Stankey (1980) refined some of his earlier research by conducting a carrying capacity survey in two wildernesses, one, a heavily used California wilderness, and the other a lightly used area in Montana. In the heavily used area, visitors were more tolerant of interparty contacts and large groups than in the lightly used area. However, in both areas solitude at campsites was very important. Users of both areas agreed that controls should be imposed by management when use exceeds capacity.

Schryer (1982) contends that recreation demand is really the "experience expectations" or the "mind set" that people take into their recreation experience. This frame of reference determines the user's satisfaction with that experience. He feels that management can, and should, obtain user feedback to utilize in decision making and monitoring of quality.

IMPACTS ON THE PHYSICAL AND BIOLOGICAL ENVIRONMENT

Wagar (1964) reported on a study conducted concerning the effects of trampling on vegetation in recreation sites. His studies showed that the regression equations he developed could be useful in predicting vegetation survival on different types of sites subject to different levels of predicted use. Further, plant durability is only one part of, but must be included in carrying capacity determination. It is interesting to note that Wagar initiated his study with the premise that carrying

capacity could be determined primarily in terms of site deterioration. However, he finally concluded, ". . . the resource oriented point of view must be augmented by consideration of human values."

By 1968, Wagar's thinking on the carrying capacity issue had evolved to a philosophy that, although ecological factors must be considered, to only think about the vegetation and wildlife would lead all management to a wilderness bias. He felt studies of ecological change could establish some "thresholds," but judgment would still be needed to establish capacities. (Wagar, 1968).

Stankey and Lime (1971) stated that the manager needs to know two things about recreational impacts on the resource in order to make carrying capacity estimates: 1) the character of change that will occur under specific levels and types of use; and 2) how the predicted change in the physical environment relates to the management objectives for the area. In writing specifically about wilderness carrying capacity, Frissell and Stankey (1972) went on to introduce the concept of acceptable change in wilderness ecology. They explain that, due to external factors over which wilderness managers have no control, there are no absolutely pristine ecosystems. The basic question the wilderness manager must ask is: What is the degree to which variation from the pristine will be permitted? They offer four alternative scenarios that managers may pursue:

1. Accept no change that exceeds the natural range of variation.

2. Keep man caused change sufficiently limited so that a return to a point within the natural range of variation is possible in a predetermined time.

3. Set the limit of acceptable change at a point where change departs from the natural rate of change.

4. Limit change to the point where it becomes obvious and objectionable to the user.

Godin and Leonard (1977) introduced a concept of design capacity which was based on the theory that a framework could be established whereby sites and their capacities could be examined in relationship to each other and, thereby, optimum use levels established. Site ecology played an important role in their theory, as they felt there was a great difference between the levels of use sites of varying degrees of fragility can support.

Probably the most useful and widely utilized work performed on the environmental impact component of wilderness carrying capacity, was accomplished by Frissell and reported in the Journal of Forestry in 1978. Frissell developed a set of campsite condition classes that are easily used by the on the ground wilderness ranger to inventory the condition of campsites in a wilderness. Frissell's condition classes are almost universally used by Forest Service wilderness managers and land management planners in establishment of existing conditions of wilderness campsites.

FRISSELL'S CLASSIFICATION SYSTEM

Condition Class	Visible Indicators	Management
1	Ground vegetation flattened but not permanently injured. Minimal physical change except for possibly a simple rock fireplace.	These sites are barely recognizable as camping areas. If not in situations known to be sensitive to use (e.g., wet or slump areas), no management action is necessary. Maintain current use level or allow increase if nearby sites must be closed.
2	Ground vegetation worn away around fireplace or center of activity.	Site change now apparent but still within acceptable limits. These areas are readily identified as campsites and will continue to attract use. Future use should be carefully monitored to detect adverse change.
3	Ground vegetation lost on most of the site, but humus and litter still present in all but a few areas.	This is a transitional condition. Considerable change in plant cover is evident but little sign of soil problems. The condition may be accepted as normal in areas of high attraction. However, modification of current use patterns and intensities may be needed to prevent further change.
4	Bare mineral soil sidespread. Tree roots exposed on the surface.	Deterioration is accelerating. If current level and type of use continues, soil erosion, loss of tree cover, and esthetic degradation are likely. Withdraw use from these sites and allow recovery. Some artificial rehabilitation may be desirable to speed recovery. If site is improperly located, permanent closure should be considered. If site is reopened, insure that use patterns are adjusted to prevent reinjury.
5	Soil erosion obvious. Trees reduced in vigor or dead.	Natural recovery will be extremely slow. The sites should be closed permanently and alternate ones located. If the site is critical to the recreation pattern, extensive rehabilitation will be required to return it to acceptable condition.

(Frissell, 1978)

DeGraff (1980) defined physical-biological carrying capacity as ". . .the amount of use an area can withstand and not suffer unacceptable impacts to the vegetation, soil, wildlife and trees." He pointed out that any use will produce some change, but management must determine how much change is acceptable, and at what point that change is to be halted or reversed.

Haas (1982) explained that the biophysical component of wilderness carrying capacity can be measured by setting limits of acceptable change. He feels that indicators, or symptoms, can be established for changes in wilderness character. By applying standards, or measurements, to these change indicators, managers can monitor change and, thereby, establish when the change is unacceptable, and take appropriate management actions.

CHAPTER III

PROCEDURES

Specific methodology for the actual establishment of carrying capacity estimates is lacking in current literature. Development of an Area Specific Implementation Program for the Indian Peaks Wilderness Area on the Arapaho and Roosevelt National Forests in Colorado in 1982, directs managers of this area to institute a permit system with established entry quotas. To reasonably establish entry quotas, the carrying capacity of the area must be estimated.

As described in literature documenting research conducted on recreation carrying capacity, there is no magic formula for carrying capacity estimation. Rather, carrying capacity is a complex blending of management objectives, social considerations and impacts on the physical and biological environment.

This chapter deals with specific data gathering needs and treatment of data. This data gathering will be required of wilderness managers on the Arapaho and Roosevelt National Forests, in order to make reasonable carrying capacity estimates for the Indian Peaks Wilderness Area.

DATA TO BE COLLECTED

Management Objectives

As a first step in carrying capacity estimation, managers must search out and list the management objectives that pertain to specific parts of the wilderness. Fortunately, management objectives for the Indian Peaks are rather well documented. Objectives are found in the Wilderness Act; Forest Service Manual; the Regional Guidelines; overall standards and guidelines for wilderness management in the draft Land and Resource Management Plan (Appendix A); the four wilderness management prescriptions contained in the draft Land and Resource Management Plan (Appendix B); the Area Specific Implementation Program for the Indian Peaks Wilderness (Appendix C); and in specific regulations for the Indian Peaks Wilderness Area (Appendix D). These objectives, determined by the preceding hierarchy of expressed management decisions and based partially on public input, increase in specificity as one goes from the Act to the Implementation Program.

Social Component

Gathering data that consider the social aspects of carrying capacity will be somewhat more difficult than determining management objectives, though some of the management objectives deal with social aspects, for instance, standards for campsite spacing, maximum numbers of occupied site guidelines, trail and camp encounters, and the upper limit capacities based on

PAOT/acre coefficients. However, in order to apply these objectives, information must be gathered. Campsites, both used and potential, must be identified and located as accurately as possible on a map, to show their positions in relation to each other. Miles of trail must be totalled and mapped. Use data must be compiled in a form useable for establishing historical patterns of trail use, campsite occupancy, average group size, and average length of stay. Seasonal wilderness rangers, and frequent users who are familiar with use patterns, must be consulted to help generate and validate the data.

Physical and Biological Component

Over the past several years, a good deal of data has been gathered regarding the physical and biological conditions in the Indian Peaks Wilderness Area. Data gathering to satisfy this aspect of carrying capacity will most likely consist of arrangement of the data in a useable form and some collection of missing data.

Again, there are management objectives that pertain directly to the physical and biological component. Such statements include: managing campsites to maintain them in various Frissell condition classes; numbers of days a particular site should be occupied during a season; restrictions on campfires; restrictions on camping in various vegetation types; and objectives for distance of campsites from bodies of water.

Data must be collected and arranged in a manner that will enable them to be applied to the established objectives. Data needed are: vegetative types

(forested, meadow, alpine tundra, krummholtz) and number of acres, located on a map; campsite locations (demonstrating their proximity to water areas); campsite condition (by Frissell condition class); and campsite size (extent of impacted area).

TREATMENT OF DATA

Once the necessary data are collected, they must be arranged by meaningful subdivisions of the wilderness, suitable for analysis. Applicable objectives must be specifically determined for these subdivisions and specific data relating to the objectives must be displayed. Once this is accomplished, analysis can be conducted, and estimates of carrying capacity can be made.

CHAPTER IV
ANALYSIS OF DATA

In order to properly display and analyze the data, logical subdivisions of the wilderness must be determined. The draft Forest Land and Resource Management Plan has made allocations of different portions of the Indian Peaks Wilderness Area to "Management Areas" for which management direction (objectives) in the form of management prescriptions have been prepared. The Area Specific Implementation Program further subdivides these Management Areas into analysis areas and establishes the maximum carrying capacity estimates, based on the area-wide PAOT/acre coefficients found in the prescriptions. For purposes of specific carrying capacity data analysis, these analysis areas must be further subdivided into travel zones, or compartments, that have similar characteristics of topography, use patterns, travel routes and entrance portals. Data can then be analyzed for each compartment, and capacities estimated. These estimated capacities can then be totalled to determine the estimated capacity for analysis areas, Management Areas, and the Wilderness.

Once the compartments are established, data should be organized in the following manner:

1. Management Objectives that apply to that particular compartment must be compiled and displayed.

2. A map must be prepared that shows: vegetative type, lakes, streams, trails, and campsite locations. Campsites, or areas, must also be identified by site size and condition so that specific information can readily be retrieved.

3. The campsite inventory data, keyed to campsite location on the map, must be accumulated for each compartment. Key information is the Frissell Condition Class of each site or area.

4. Use information which must be determined for the compartment is average group size and average length of stay.

Once the data are arranged in this manner, it is relatively simple to perform an analysis which will provide an estimate of carrying capacity for the compartment.

The following hypothetical scenario displays the investigator's recommended methodology for arrangement and analysis of data to estimate carrying capacity. This example analyzes an imaginary 260 acre compartment surrounding an imaginary "Red Lake."

I. DATA DISPLAY

A. General Compartment Information

Compartment:	Red Lake
Size:	260 acres
A.S.I.P. Analysis Area	17

Forest Plan Management Area: 8C (semi-primitive)

Pattern of Use Class: High (from R.O.S. users guide)

B. Applicable Management Objectives (from the management prescription for Management Area 8C and specific Indian Peaks Wilderness regulations)

1. No more than 20 encounters with other parties per day.

2. In open lands, no more than three people at one time per mile of trail.

3. In forested areas, no more than 11 people at one time per mile of trail.

4. The area-wide finite upper limit carrying capacity based on coefficient in management prescription: .08 x 260 acres = 20.8 = 21 PAOT (for the purposes of this demonstration it is assumed that all 260 acres are useable and meet attractiveness criteria. In actual cases, only useable acres and acres meeting the attractiveness criteria in the R.O.S. users guide, Chapter 25, would be used).

5. Campsites will be located at least 300 feet apart.

6. Campsites will be located at least 100 feet from lakes, streams, or trails.

7. Up to four campsites may be occupied at one time to provide for a moderate degree of solitude.

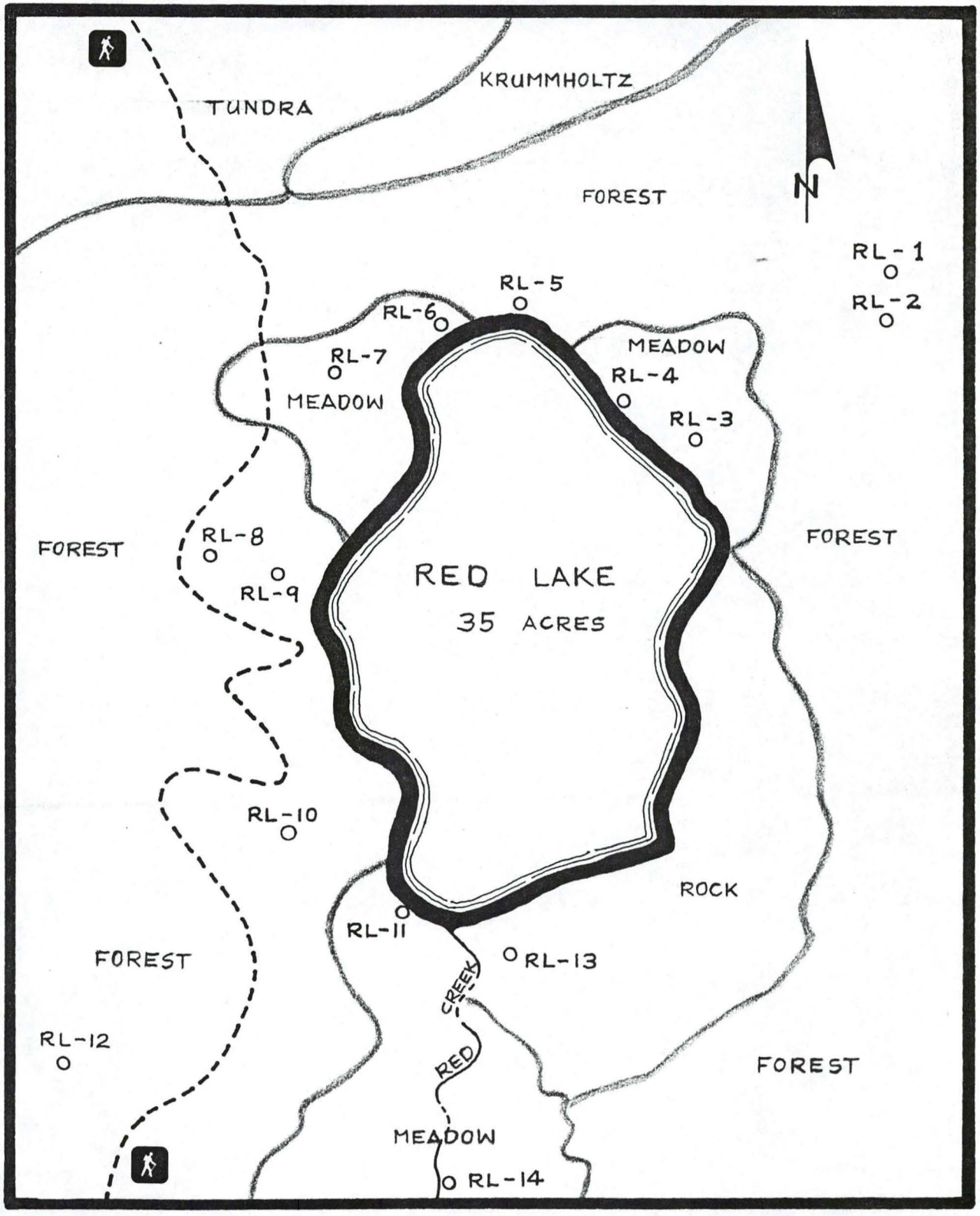
8. Along streams and trails in open areas, three sites/mile may be occupied at one time to provide for a moderate degree of solitude.

9. Along streams and trails in forested areas, six sites/mile may be occupied at one time to provide for a moderate degree of solitude.

10. Allow use only on campsites that are in Frissell Condition Class 3 or better.

11. Designate campsites in Frissell Conditions Classes 1-3. In rare instances, Condition Class 4 sites can be designated, if there are not enough 3 or below sites to meet other objectives.

C - MAP
RED LAKE COMPARTMENT



NO SCALE

D. Physical Data

1.	Miles of trail in compartment	1
2.	Size of lake	35 acres
3.	Area forested	110 acres
4.	Area meadow	50 acres
5.	Area rock and non-vegetated	30 acres
6.	Area alpine tundra	20 acres
7.	Area krummholtz	15 acres

E. Campsite Inventory Data

Site #	Frissell's Condition Class	Information
RL-1	1	Forested, ¼ mile northeast of lake on small bench.
RL-2	5	Forested, ¼ mile northeast of lake on bench, 300' south of RL-1.
RL-3	5	Meadow, 50' from lake on northeast shore.
RL-4	4	Meadow, on northeast lakeshore.
RL-5	4	Forested, 25' from north shore of lake.

RL-6	5	Meadow on north shore of lake.
RL-7	3	Meadow, on north shore of lake, southwest of RL-6, 150' from lake.
RL-8	2	Forested, 300' west of lake, 50' east of Red Lake Trail.
RL-9	5	Forested, 100' west of lake and 200' east of RL-8.
RL-10	5	Forested, 200' southwest of lake.
RL-11	3	Meadow, on southwest shore of lake.
RL-12	1	Forested, ¼ mile southwest of lake, 150' west of Red Lake Trail.
RL-13	1	On rock bluff, 150' south of lake and 100' east of Red Creek.
RL-14	5	Meadow, ¼ mile down stream from Red Lake on edge of Red Creek.

F. Use Data

1. Average group size 4
2. Average length of stay 2 nights

II. ANALYSIS

A. Campsite Condition

Campsite Number	Frissell Condition Class 1	2	3	4	5
	RL-1	RL-8	RL-7	RL-4	RL-2
	RL-12		RL-11	RL-5	RL-3
	RL-13				RL-6
					RL-9
					RL-10
					RL-14
Total	3	2	2	2	6

The six campsites in Frissell condition class 5 can be deleted from further consideration, and scheduled for closure and rehabilitation. The two sites in condition class 4 can be given further consideration, since they may be designated sites if needed and desirable.

B. Distance from Water or Trails

	More than 100 feet	Less than 100 feet
Campsite number	RL-1	RL-4
	RL-7	RL-5
	RL-12	RL-8
	RL-13	RL-11
Total	4	4

The four campsites that are located closer than 100 feet from lakes, streams or trails can now be deleted from further consideration, and scheduled for closure and rehabilitation.

C. Campsite Spacing

A visual analysis of the map shows that the four remaining campsites (RL-1, RL-7, RL-12 and RL-13) are all more than 300 feet from each other, therefore, they all meet the management objectives for campsite spacing. If two or more of the remaining sites were closer than 300 feet from one another, judgment would have to be applied to determine which campsite to retain. Condition class and subjective campsite suitability criteria could be applied to this decision, i.e., forested sites would be favored over those located in meadows, alpine tundra or krummholtz.

D. Solitude Analysis

The management objective in Management Area 8C is to provide for a moderate level of campsite solitude by allowing up to four sites to be occupied at one time at lakes over 25 acres in size.

In our Red Lake example, we have four suitable sites. If we were to have more suitable sites than the maximum allowed for solitude, they could all be left open, but campsite capacity would be set based on four sites. If there were less than four, campsite capacity would have to be based on that number until a rehabilitated site recovered and became useable.

E. Campsite Carrying Capacity

Four campsites remain in the Red Lake compartment that meet all management objectives for campsite suitability. Our use data show an historical average group size of four. Therefore, the campsite carrying capacity for the Red Lake compartment can be estimated as being 16 people at one time (4 campsites x 4 people).

F. Modification for Encounters With Other Parties and Trail Capacities

The management objective for encounters with other parties per day is less than 20. In this example, it is unlikely that there will be more than 20 encounters. However, if this were not the case, a

downward adjustment in the compartment's campsite carrying capacity would have to be made.

The management objective for trail capacity is no more than 11 people at one time per mile in forested areas, and no more than three people per mile in open areas. In the Red Lake example, our campsite carrying capacity indicates 16 people. All but two small portions of the one mile of trail is in forest. Again, subjective judgment must be applied. Since the use data show that the average length of stay at Red Lake is two nights, it is highly unlikely that all 16 people will be on the trail at one time, therefore, this number will most likely not exceed the carrying capacity for the trail. If the average length of stay was only one night, the carrying capacity should be adjusted downward.

G. Comparison With Area-wide Finite Upper Limit Carrying Capacity

The finite upper limit carrying capacity, based on gross acreage, is 21 people at one time. Our indicated carrying capacity of 16 people at one time compares favorably with this number. If, at this point in the process, the indicated carrying capacity were greater than the finite upper limit, the indicated capacity would have to be lowered to that number.

H. Estimated Carrying Capacity

Based on the analysis of data, the estimated carrying capacity for the Red Lake compartment is 16 people at one time.

III. SUMMARY

As displayed in the preceding example, it is possible to estimate wilderness carrying capacity in a relatively simple manner, using easily gathered data. For demonstration purposes, the hypothetical example used by the investigator is over simplified. Actual case situations will be more complicated, and involve more judgment decisions. However, the basic format of utilizing management objectives to set parameters for social and physical-biological carrying capacity decisions will be utilized in every case.

CHAPTER V

SUMMARY AND CONCLUSIONS

An Area Specific Implementation Program for the Indian Peaks Wilderness Area, prepared in 1982, directs management to implement a permit system utilizing entry quotas to limit use and associated degradation of the wilderness resource. As a first step in establishing entry quotas for the wilderness carrying capacity, estimates must be made. The focus of this study is to recommend an easily used methodology for estimating carrying capacity of the Indian Peaks Wilderness Area.

SUMMARY OF PROCEDURES

The procedures used were to:

1. Research the voluminous amount of literature written about the subject of recreation carrying capacity, and, specifically, wilderness carrying capacity. This literature review indicated that, although the subject of carrying capacity is extremely complex, there are three basic components to be considered and interrelated. These components are: management objectives; social considerations; and physical-biological considerations.

2. Relate the three components of carrying capacity to the Indian Peaks Wilderness Area, utilizing ideas suggested by other National

Forest Wilderness Managers. Methods and recommendations from the Desolation, John Muir and Minarets areas in California, and the Boundary Waters Canoe area in Minnesota were considered.

CONCLUSION

Based upon the findings and within the limitations of this study, carrying capacity for the Indian Peaks Wilderness Area can be estimated in reasonable and defensible numbers. These estimates can be utilized in limiting use by trailhead quotas and a mandatory permit system. Carrying capacity estimates can be made using the methodology and data requirements outlined in Chapter IV of this paper.

DISCUSSION AND IMPLICATIONS

Carrying capacity estimates are only that, estimates. The methodology recommended in this paper will allow the establishment of estimates of proper carrying capacity for the Indian Peaks Wilderness Area. However, the methodology does not consider the implications of recreation livestock use, use by large parties, or the impacts of day use. Livestock capacity will have to based on available forage, number and location of sites suitable for such use. Sites suitable for use by large groups must be identified and, where appropriate, meshed into the carrying capacity estimate for a compartment. Day use capacities can be partially estimated by using the trail capacity objectives in the wilderness management prescriptions and the finite upper limit capacity coefficients.

Additionally, the methodology only makes estimates for one particular point in time. As campsites are rehabilitated, recover, and again become useable, carrying capacity will increase. As users become more educated and learn to utilize the techniques of "limited impact camping," carrying capacity increases.

Frequent monitoring of the physical and biological resources must be accomplished, and carrying capacity adjustments made. Input from wilderness users must be sought out and listened to and adjustments made, based on social considerations. Observations and reports of Wilderness Rangers must be considered and necessary adjustments made.

Application of this methodology can be a first step in limiting use in the Indian Peaks Wilderness Area, resulting in improved condition of the wilderness resource and enhanced wilderness experience. Care must be taken to not "set these numbers in concrete;" flexibility must be maintained.

RECOMMENDATIONS

It is recommended that the Wilderness Managers of the Indian Peaks Wilderness Area utilize the methodology described in this paper to estimate carrying capacities. Estimates generated by this methodology can then be translated to entry quotas for the various entry points of the Wilderness, to be controlled by a mandatory permit system. It is further recommended that careful monitoring is performed and necessary adjustments made.

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APPENDIX

APPENDIX A

Forestwide Direction for Wilderness Area Management--Latest Version from Draft Land and Resource Management Plan; Arapaho and Roosevelt National Forests.

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Dispersed Recreation Management (A14 and 15)		c. Do not exceed a motorized trail density of .003 miles/acre on any nonforested areas. (6639AR) d. In forested areas, off-road vehicle (ORV) trails may be built until trail density in a watershed reaches .006 miles of ORV trail per acre. Design trail construction to protect meadow areas. Construct trails to Level 3 standard as defined in the Management Information Handbook. (6637AR) e. Prohibit off-road vehicle use within riparian areas except at designated crossings. (6638AR)
	8. Prohibit camping in one location for more than 14 consecutive nights. (0663AR)	
Recreation Management (Private and Other Public Sector) (A16)	1. Ensure that permitted private and public sector sites on Forest Service lands which are adjacent to, or provide an access point into, a wilderness complement wilderness management objectives. (0457)	
Wilderness Area Management (B02)	1. Do not provide interpretive facilities at cultural resources sites, nor restore or enhance cultural resources for recreation purposes. (0172)	
	2. Provide opportunities for human isolation, solitude, self-reliance and challenge while traveling cross-country and on system trails. (0191)	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES

CONTINUATION OF:
Wilderness Area Management (B02)

3. Utilize a permit system to manage use levels and patterns during the summer use period based upon the following criteria:

a. When acceptable use levels, as specified in the individual prescriptions, are exceeded during 20 percent of the summer use season, or
b. When acceptable capacities, as specified in the individual prescriptions, in primitive or pristine management areas are exceeded on 10 percent or more of the days during the summer use season.

c. Apply a permit system to an entire wilderness, not just impacted portions of a wilderness.
(0192)

4. Campsites may be designated as part of a permit system.
(0681AR)

5. Manage recreation use consistent with the carrying capacity of the area.
(0665AR)

a. Maximum wilderness use and capacity range during the snow free period (PAOT/acre):

Management area - Pristine

Use Level	Very Low	Low	Moder-ate	High*
PAOT/acre	.001	.003	.005	.07

Management area - Primitive

Use Level	Very Low	Low	Moder-ate	High
PAOT/acre	.002	.005	.01	.02

Management area - Semi-Primitive

Use Level	Very Low	Low	Moder-ate	High
PAOT/acre	.004	.008	.05	.08

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES

CONTINUATION OF:
Wilderness Area Management (B02)

Management area - Day Use

Use Level	Very Low	Low	Moderate	High
PAOT/acre	.04	.08	.5	5

* VERY LOW applies to alpine and krumholz.

LOW applies to rock; mtn. grass; and openings in forest canopy 1-20 years old.

MODERATE applies to LP size class 9; mtn. grass; PP size clas 9, 8, and 7; DF size class 9, 8, and 7; Aspen size class 9; SF size class 7.

HIGH applies to densly forested areas; SF size class 9 and 8; LP size class 8 and 7; Aspen size class 8 and 7.

Reduce the above use level coefficents as necessary to reflect usable acres, patterns of use and general attractiveness of the specific management area type as described in the ROS users guide, Chapter 25.

Reduce the above use levels where unacceptable changes to the bio-physical resources will occur. (6275AR)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Wilderness Area Management (B02)	6. Do not impose party-size limits during traditionally light-use seasons or during fall hunting seasons unless necessary to prevent unacceptable levels of change to the biological and physical resources. (0193)	
	7. Maximum party-size limit for the summer use period is 25 people and/or recreational stock. Party size limits less than 25 people and/or recreational stock will be established where biological and physical resource capability cannot support that level of use. Party sizes established for protection of biophysical resources will set limits for both people and recreational stock. Parties larger than established limits may be allowed under permit on a case-by-case basis when compatible with other wilderness management objectives. (0194)	
	8. Prohibit competitive contest events, group demonstrations, ceremonies, and other similar events. (0209)	
	9. Prohibit dogs, or require them to be physically controlled on a leash. Exceptions will be made for permittee's working dogs, and for hunting dogs while hunting during legal seasons. (0202)	
	10. Prohibit recreational stock along lake shores and streambanks except for watering and through-travel. (0204)	
	11. Require users camping overnight with recreational stock to carry cubed, pelleted, or rolled feed and/or certified weed-free hay where grazing is prohibited. (0176)	
	12. Control overnight grazing of recreational stock in alpine and Krummholz ecosystems according to use standards in Forest Direction. (0206)	a. Base range condition on [illegible] standards in Range Analysis Handbook (FSH 2209.21). (6156) b. Allowable soil disturbance criteria: 20% maximum disturbance on ranges

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Wilderness Area Management (B02)		with good-excellent soil stability condition on 0-15% slopes. 15% maximum disturbance on ranges with fair soil stability conditions on slopes less than 15% and good or better soil stability conditions on slopes of 16-25% 10% maximum disturbance on ranges with fair soil stability conditions on slopes of 16-25%, and good soil stability conditions on slopes of 26-45%. (6280)
	13. Prohibit new range improvement structures other than corrals, fences or water developments absolutely essential to sustain current permitted numbers. (0221)	
	14. Implement revegetation only for rehabilitation of areas in less than "fair" range condition based upon their natural potential. Use only native species for revegetation. Implement only where natural vegetation possibilities are poor, and only where degradation was due to human activities. (0177)	a. Base range condition on the standards in Range Analysis Handbook (FSH 2209.21). (6156)
	15. Permit fish and wildlife research and management utilizing guidelines adopted by the International Association of Fish and Wildlife Agencies (FSM 2323.3). (0179)	
	16. See Mining Law Compliance and Administration and Minerals Management Activities in Forest Direction for minerals direction. (0476)	
	17. Manage site use and occupancy to maintain sites within Frissell condition class 3 except for designated sites which may be class 4. Close and restore class 5 sites. (0175)	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Wilderness Area Management (B02)	18. Suppress man-caused wildfires. (0186)	
	19. Maintain fire-dependent ecosystems using prescribed fires ignited naturally. Reclaim areas disturbed as part of fire control activities to meet the visual quality objective of retention. (0187)	
	20. Protect air quality related values from adverse effects from air pollution. (0188)	a. See criteria and standards in FSM 2120. (6286)
	21. Control natural insect or disease outbreaks in wilderness only when justified by predicted loss of resource values outside of wilderness. Conduct analysis in accordance with FSM 3430. (0190)	
	22. Control problem animals on a case-by-case basis in cooperation with other agencies (FSM 2610) using methods directed at the offending animal but which present the least risk to other wildlife, and/or visitors. (0180)	

APPENDIX B

Management Prescriptions for Wilderness Management--Draft Land and Resource Management Plan, Arapaho and Roosevelt National Forests.

Management Area 8a--Pristine

Management Area 8b--Primitive

Management Area 8c--Semi-Primitive

Management Area 8d--Day Use

B. MANAGEMENT REQUIREMENTS

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Visual Resource Management (A04)	1. Design and implement management activities to maintain a pristine ecosystem. (0218)	a. The Adopted Visual Quality Objective (VQO) is Preservation. (6132)
Dispersed Recreation Management (A14 and 15)	1. Provide opportunities for primitive and unconfined recreation featuring solitude and to travel cross-country in an environment where success or failure is directly dependent on ability, knowledge and initiative. (0223)	
	2. Emphasize recreation opportunities on the most primitive end of the recreation opportunity spectrum. Manage use to provide very infrequent contact with other groups or individuals. (0224)	a. Maximum use and capacity levels are: - trail and camp encounters during peak use days are less than 2 other parties per day. - trail and area-wide use capacity: (1) open lands, meadow and alpine: 0.001 to 0.002 PAOT per acre. (2) forested lands and shrub lands: 0.003 to 0.007 PAOT per acre. - reduce the above use levels where unacceptable changes to the biophysical resources are likely to occur. (6128)
	3. Limit specially permitted parties to not more than one per 2500 acres. (0226)	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Dispersed Recreation Management (A14 and 15)	4. Prohibit open fires in alpine, krummholz, meadow areas and within riparian areas when: a. Use of dead and down wood for fuel is likely to violate diversity requirements, soil nutrient and erosion protection, or b. Visual resource objectives for the area likely could not be met. (0199) 5. Manage site use and occupancy to maintain sites in Frissell condition class 2 or better, except for designated sites which may be class 3. (0630AR)	
Recreation Management (Private and Other Public Sector) (A16)	1. Manage outfitter-guide operations in the same manner as other visitors. Permit camping only in sites specified in outfitter-guide permits. Keep outfitter-guide activities harmonious with activities of non-guided visitors. Include outfitter-guide operations in calculations of level-of-use capacities. (0208)	
Wildlife and Fish Resource Management (C01)	1. Manage human activity so that wildlife and plant species population dynamics and distribution occurs naturally. Prohibit fish stocking except for reintroduction of indigenous species or where stocking has been previously authorized and practiced. (0220)	
Range Resource Management (D02)	1. Manage livestock and herbivorous wildlife forage use in accordance with FSM 2320.3 (36 CFR 293.7). (0182)	a. Follow established utilization standards for areas, within grazing allotments. (6130) b. Limit utilization of forage to not more than 30 percent of current annual growth outside established allotments. (6342) c. Limit trampling of forage to not more than 40 percent of current annual herbaceous vegetation growth, outside established allotments.

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Range Resource Management (D02)		(6344)
Special Use Management (Non-Recreation) (J01)	1. Permit only those uses authorized by wilderness legislation, which cannot be reasonably met on non-Wilderness lands. (0211)	
Soil Resource Management (KA1)	1. Restore soil disturbances caused by human use (past mining, grazing, trail construction and use, camping, etc.) to soil loss tolerance levels commensurate with the natural ecological processes for the treatment area. (0184)	a. Follow procedures specified in Agricultural Handbook 537 for Utilizing the Universal Soil Loss Equation. (Cautions contained in WO 2550 letter dated 5/28/82 should be noted.) The guidance for K and T factors are in the National Soils Handbook 407.1 (a)(3)(xvii). (6159) b. Provide Frissell condition classes 1 and 2 campsites only. (6133)
Trail Construction and Reconstruction (L22)	1. Do not construct or reconstruct trails. (0228)	a. Restore trails to stabilize prism. (6617AR)
FA&O Construction Reconstruction and Maintenance (L24 AND 25)	1. Prohibit man-made structures and facilities. (0219)	

B. MANAGEMENT REQUIREMENTS

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Visual Resource Management (A04)	1. Design and implement management activities so that the impact of man is not apparent and the area appears in a condition affected only by natural biotic succession. (0230)	a. The Adopted Visual Quality Objective (VQO) is Preservation. (6132)
Dispersed Recreation Management (A14 and 15)	1. Emphasize primitive recreation opportunities requiring a high degree of isolation, solitude, self-reliance and challenge while traveling cross-country or on system trails. (0231)	
	2. Prohibit open fires in alpine, krummholz, meadow areas and within riparian areas when: a. Use of dead and down wood for fuel is likely to violate diversity requirements, soil nutrient and erosion protection, or b. Visual resource objectives for the area likely could not be met. (0199)	
	3. Manage use to provide a low incidence of contact with other groups or individuals and to prevent unacceptable changes to the biophysical resources. (0301)	a. Area-wide Capacity: (PAOT/Acre) Open Lands Alpine, Krummholz .002 Rock, Mtn. grass .005 Forest & Shrub Lands Ponderosa Pine, Douglas-fir, Riparian areas, White Pine .01 Spruce/Fir, Lodgepole Pine, Aspen .02 (6336) b. Reduce visitor use when the level of use exceeds capacity on more than 10 percent of the days during summer and fall use season. (6374)
	4. Manage sites to provide opportunity for moderate to high degree of solitude. (0626)	a. Use a minimum site spacing of 500 feet. (6338)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Dispersed Recreation Management (A14 and 15)		b. Occupied site guidelines: (Maximum number of sites occupied at one time.) Lakes <5 acres 2; 5-25 acres 3; >25 acres 4. Depending on site suitability/ availability. Streams and Trails: Open areas 2 sites/mile; Forested areas 4 sites/mile. (6340)
Recreation Management (Private and Other Public Sector) (A16)	1. Manage outfitter-guide operations in the same manner as other visitors. Permit camping only in sites specified in outfitter-guide permits. Keep outfitter-guide activities harmonious with activities of non-guided visitors. Include outfitter-guide operations in calculations of level-of-use capacities. (0208)	
Wildlife and Fish Resource Management (C01)	1. Permit fish and wildlife research and management utilizing guidelines adopted by the International Association of Fish and Wildlife Agencies (FSM 2323.3). (0179)	
Range Resource Management (D02)	1. Manage livestock and herbivorous wildlife forage use in accordance with FSM 2320.3 (36 CFR 293.7). (0182)	a. Follow established utilization standards for areas, within grazing allotments. (6130)
Special Use Management (Non-Recreation) (J01)	1. Manage surface occupancy activities authorized prior to wilderness designation to reduce impact on wilderness values consistant with the intent of the occupancy authorization. (0210)	
	2. Permit only those uses authorized by wilderness legislation, which cannot be reasonably met on non-Wilderness lands. (0211)	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Soil Resource Management (KA1)	1. Restore soil disturbances caused by human use (past mining, grazing, trail construction and use, camping, etc.) to soil loss tolerance levels commensurate with the natural ecological processes for the treatment area. (0184)	a. Follow procedures specified in Agricultural Handbook 537 for Utilizing the Universal Soil Loss Equation. (Cautions contained in WO 2550 letter dated 5/28/82 should be noted.) The guidance for K and T factors are in the National Soils Handbook 407.1 (a)(3)(xvii). (6159) b. Provide Frissell condition classes 1 and 2 campsites only. (6133)
Transportation System Management (L01 & 20)	1. Locate and design required access roads within the management area for authorized activities to minimize the biophysical and visual impact, and to facilitate restoration. (0213)	a. Roads will not be authorized: - on slopes steeper than 60%; - in areas of high erosion hazard; - in areas of high geologic hazard; - in areas of low visual absorption capacity that are unlikely for successful restoration; - in areas which would adversely effect threatened and endangered plant and animal species. (6165)
	2. Convert roads not needed for authorized activities to trails, or if they are not needed as part of the transportation system, restore them to the established VQO. (0254)	a. Maintain trails in accordance with standards in the Trail Handbook (FSH 7709.12). (6129) b. Schedule trail maintenance in accordance with Regional Acceptable Work Standards. (FSM 1310 R2 ID No. 1 7/22/82.) (6131)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Transportation System Management (L01 & 20)	3. Construct or reconstruct trails only when needed to meet objectives of the wilderness transportation system. (0255)	a. Follow standards specified in FSH 7709.12, FSM 2323.11c and 2323.61d w/R-2 Supplement. (6134) b. Trail density will be less than one mile per square mile. Trails are constructed and maintained for established capacity levels. (6161)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Transportation System Management (L01 & 20)	4. Construct bridges to only the standard necessary to accommodate the specified class of user. Construct bridges only where no safe opportunity exists to cross a stream or gorge during periods of normal stream flow. A safety hazard is a physical condition of a trail which may cause injury, is unusual or unexpected, and not readily identifiable by the trail user. It is not a condition which is easily identifiable and normally encountered for the type or location of the trail involved. The following examples illustrate this distinction: A hazard is a rotten bridge decking or handrail. A stream crossing where no bridge is provided and the user would expect this on the type and location of the trail is not a hazard. A hazard is a stable-appearing loose rock in a constructed treadway where all other rocks are stable. A trail treadway made up of rocks in a near-natural position, many of which are loose, is not a hazard. A hazard is a perennial bog-hole on a horse trail. An intermittent bog-hole which will dry up by early summer or within a few days following a rain storm is not a hazard. A hazard is a section of trail treadway supported by rotten cribbing. A section of trail where the treadway is obviously slippery is not a hazard. A hazard is a marked ford with holes deeper than the normal channel. A deep ford with a consistent stream bed is not a hazard. (0214) 5. Use corduroy and/or puncheon treads across bogs where no safe and feasible bypass opportunity exists. (0215) 6. Close or sign system trails when not maintained to the safe standard for the specified use. (0216)	a. Maintain trails in accordance with standards in the Trail Handbook (FSH 7709.12). (6129)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Transportation System Management (L01 & 20)	7. Use signs of unstained wood with routed letters and mounted on unstained posts. (0249)	a. Follow standards specified in FSH 7109.11a and 11b. (6158)
	8. Provide signs at trail terminals and trail junctions only. Include only trail identification and identification of terminal points. (0250)	
FA&O Construction Reconstruction and Maintenance (L24 AND 25)	1. Prohibit construction of new administrative facilities or structures. In the event a substantial portion of the existing administrative facility and/or structure is destroyed, it will not be replaced. (0207)	

B. MANAGEMENT REQUIREMENTS

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Visual Resource Management (A04)	1. Manage for maximum retention of the natural landscape. Design and locate management activities to meet the Visual Quality Objective of Preservation in all areas except where specific surface occupancy is authorized by Wilderness legislation. In these areas, the Visual Quality Objective is Retention. (0173)	
Dispersed Recreation Management (A14 and 15)	1. Provide semi-primitive recreation opportunities requiring predominately unmodified natural settings, with a moderate to high degree of challenge and risk while traveling cross-country or on trails. (0237) 2. Prohibit open fires in alpine, krummholz, meadow areas and within riparian areas when: a. Use of dead and down wood for fuel is likely to violate diversity requirements, soil nutrient and erosion protection, or b. Visual resource objectives for the area likely could not be met. (0199) 3. Permit undesignated sites in Frissell condition class 1 through 3 where unrestricted camping is permitted. (0174) 4. Manage summer use to allow low to moderate contact with other groups and individuals. Manage winter use for very low or low densities for each ROS opportunity class. (0238)	a. Areawide Capacity: (PAOT/Acre) Open lands Alpine, Krummholz .004 Rock, Mtn. grass .008 Forest and Shrub lands Ponderosa Pine, Douglas-fir, Riparian areas, white pine .05 Spruce/fir, Lodgepole Pine, Aspen .08 (6126) b. Maximum use and capacity levels are: - trail and camp encounters

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES

CONTINUATION OF:
Dispersed
Recreation
Management
(A14 and 15)

during peak use days are less than 20 other parties per day.
-trail capacity is displayed below:

Use Level	Open Lands	Forest & Shrub Lands
On Trails (PAOT/Mile)	2-3	9-11
Area-Wide (PAOT/Acre)	0.08 to 0.9	

(6346)

c. Reduce visitor use when the level of use exceeds capacity on more than 20 percent of the days during the summer use season.
(6019)

5. Reduce visitor use when the level of use exceeds capacity for more than 20 percent of the summer use season.
(0489)

6. Permits for parties larger than the established limit may be issued when their presence can be adequately screened from the sights and sounds of other parties in the area.
(0302)

7. Manage location of campsites to provide a high degree of solitude.
(0628)

a. Locate campsites at least 300' apart.
(6348)

b. Occupied Site Guidelines:
(Maximum number of sites occupied at one time.)

Lakes	< 5 acres	2
	5-25 acres	3
	>25 acres	4
Streams		

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Dispersed Recreation Management (A14 and 15)		Open areas 3 sites/mile Forested areas 6 sites/mile (6350)
	8. Manage site use and occupancy to maintain sites within Frissell condition class 3 except for designated sites which may be class 4. (0636)	a. Allow sites to be occupied 20 days/summer season or to the level required to maintain at least a stable trend in site condition. (6352) b. Close and restore Frissell condition class 4 sites unless a designated site. Close and restore class 5 sites. (6354)
Recreation Management (Private and Other Public Sector) (A16)	1. Manage outfitter-guide operations in the same manner as other visitors. Permit camping only in sites specified in outfitter-guide permits. Keep outfitter-guide activities harmonious with activities of non-guided visitors. Include outfitter-guide operations in calculations of level-of-use capacities. (0208)	
Range Resource Management (D02)	1. Manage livestock and herbivorous wildlife forage use in accordance with FSM 2320.3 (36 CFR 293.7). (0182)	a. Follow established utilization standards for areas within grazing allotments. (6130)
Special Use Management (Non-Recreation) (J01)	1. Manage surface occupancy activities authorized prior to wilderness designation to reduce impact on wilderness values consistant with the intent of the occupancy authorization. (0210)	
	2. Permit only those uses authorized by wilderness legislation, which cannot be reasonably met on non-Wilderness lands. (0211)	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Soil Resource Management (KA1)	1. Restore soil disturbances caused by human use (past mining, grazing, trail construction and use, camping, etc.) to soil loss tolerance levels commensurate with the natural ecological processes for the treatment area. (0184)	a. Follow procedures specified in Agricultural Handbook 537 for Utilizing the Universal Soil Loss Equation. (Cautions contained in WO 2550 letter dated 5/28/82 should be noted.) The guidance for K and T factors are in the National Soils Handbook 407.1 (a)(3)(xvii). (6159)
Transportation System Management (LO1 & 20)	1. Locate and design required access roads within the management area for authorized activities to minimize the biophysical and visual impact, and to facilitate restoration. (0213)	a. Roads will not be authorized: - on slopes steeper than 60%; - in areas of high erosion hazard; - in areas of high geologic hazard; - in areas of low visual absorption capacity that are unlikely for successful restoration; - in areas which would adversely effect threatened and endangered plant and animal species. (6165)
	2. Convert roads not needed for authorized activities to trails, or if they are not needed as part of the transportation system, restore them to the established VQO. (0254)	a. Maintain trails in accordance with standards in the Trail Handbook (FSH 7709.12). (6129) b. Schedule trail maintenance in accordance with Regional Acceptable Work Standards. (FSM 1310 R2 ID No. 1 7/22/82.) (6131)
	3. Construct or reconstruct trails only when needed to meet objectives of the wilderness transportation system. (0255)	a. Follow standards specified in FSH 7709.12, FSM 2323.11c and 2323.61d w/R-2 Supplement. (6134)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES

CONTINUATION OF:
Transportation System Management
(L01 & 20)

b. Trail density will not exceed two miles per square mile. Trails are constructed and maintained for moderate to high levels of use as specified below.
(6162)

4. Construct bridges to only the standard necessary to accommodate the specified class of user. Construct bridges only where no safe opportunity exists to cross a stream or gorge during periods of normal stream flow.

A safety hazard is a physical condition of a trail which may cause injury, is unusual or unexpected, and not readily identifiable by the trail user. It is not a condition which is easily identifiable and normally encountered for the type or location of the trail involved. The following examples illustrate this distinction:

A hazard is a rotten bridge decking or handrail. A stream crossing where no bridge is provided and the user would expect this on the type and location of the trail is not a hazard.

A hazard is a stable-appearing loose rock in a constructed treadway where all other rocks are stable. A trail treadway made up of rocks in a near-natural position, many of which are loose, is not a hazard.

A hazard is a perennial bog-hole on a horse trail. An intermittent bog-hole which will dry up by early summer or within a few days following a rain storm is not a hazard.

A hazard is a section of trail treadway supported by rotten cribbing. A section of trail where the treadway is obviously slippery is not a hazard.

A hazard is a marked ford with holes deeper than the normal channel. A deep ford with a consistent stream bed is not a hazard.
(0214)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Transportation System Management (L01 & 20)	5. Use corduroy and/or puncheon treads across bogs where no safe and feasible bypass opportunity exists. (0215)	
	6. Close or sign system trails when not maintained to the safe standard for the specified use. (0216)	a. Maintain trails in accordance with standards in the Trail Handbook (FSH 7709.12). (6129)
	7. Use signs of unstained wood with routed letters and mounted on unstained posts. (0249)	a. Follow standards specified in FSH 7109.11a and 11b. (6158)
	8. Provide signs at trail terminals and trail junctions only. Include only trail identification and identification of terminal points. (0250)	
	9. Provide horse bridges where no safe crossing exists during heavy flow. Provide foot bridges (rustic) at other crossings. (0654AR)	
FA&O Construction Reconstruction and Maintenance (L24 AND 25)	1. Prohibit construction of new administrative facilities or structures. In the event a substantial portion of the existing administrative facility and/or structure is destroyed, it will not be replaced. (0207)	

B. MANAGEMENT REQUIREMENTS

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
Visual Resource Management (A04)	1. Manage for maximum retention of the natural landscape. Design and locate management activities to meet the Visual Quality Objective of Preservation in all areas except where specific surface occupancy is authorized by Wilderness legislation. In these areas, the Visual Quality Objective is Retention. (0173)	
	2. Permit relics of historic human occupancy (such as abandoned cabins or mines) if they are limited in scope and visual quality objectives are met. (0030AR)	
Dispersed Recreation Management (A14 and 15)	1. Provide semi-primitive recreation opportunities requiring a predominately unmodified natural setting with a low degree of challenge and risk and travel on system trails. (0245)	a. Designated sites will be spaced only as required for reasonable screening between sites or at least 100 feet apart. (6358)
		b. Close and restore sites in Frissell condition class 5. Designated sites may occur in Frissell condition class 1 through 4. (6360)
		c. Prohibit recreation livestock. except for through travel. (6362)
		d. Require self-contained stoves. Prohibit open campfires. (6364)
	2. Manage for day-use and through-travel and to prevent unacceptable changes to the biophysical resources. (0243)	
	3. Allow overnight camping only at designated sites where conflict with day-use can be avoided. (0630)	a. Maximum use and capacity levels is reached when trail and camp encounters during peak-use days are more than 20 other parties per day.

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Dispersed Recreation Management (A14 and 15)		AREAWIDE CAPACITY (PAOT/Acre) Open Lands Alpine, Krummholz .04 Rock, Mtn. Grass .08 Forest and Shrub Lands Ponderosa pine, Douglas fir, Riparian areas, white pine .5 Spruce/fir, Lodgepole pine, aspen .8 (6125) b. Reduce the above use level coefficients as necessary to reflect usable acres, patterns of use, and general attractiveness of the specific management area type as described in the ROS Users Guide. Chapter 25. Reduce the above use levels where unacceptable changes to the biophysical resources will occur. (6356)
Recreation Management (Private and Other Public Sector) (A16)	1. Permit only through-travel for outfitter-guide operations during the summer-use season. (0248)	
Wildlife and Fish Resource Management (C01)	1. Protect habitat requirements over human use, even on a short-term basis. Priorities are: a. State and Federal classified threatened or endangered species needs; b. Permitted livestock where allowed by Wilderness leglislation; and c. Recreation livestock. (0178)	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Wildlife and Fish Resource Management (C01)	2. Distribution of wildlife populations may be affected by recreation use. Manage habitats for a high level of habitat effectiveness to reduce the effects of human disturbance. (0034AR)	
Range Resource Management (D02)	1. Prohibit grazing and trailing of permitted livestock except where no feasible alternative access to an allotment is available. (0241)	
	2. Manage meadows and lakeshores in "good" range condition. Limited areas of "fair" are permissible in areas of user concentrations. However, "fair" areas must be exhibiting an upward trend. (0235)	a. Base range condition on the standards in Range Analysis Handbook (FSH 2209.21). (6156)
	3. Prohibit overnight use of recreational stock. (0247)	
	4. Maintain trailside vegetation in at least a "fair or better" condition based upon natural productivity of the area. (0234)	a. Base range condition on the standards in Range Analysis Handbook (FSH 2209.21). (6156)
Special Use Management (Non-Recreation) (J01)	1. Manage surface occupancy activities authorized prior to wilderness designation to reduce impact on wilderness values consistant with the intent of the occupancy authorization. (0210)	
	2. Permit only those uses authorized by wilderness legislation, which cannot be reasonably met on non-Wilderness lands. (0211)	
Soil Resource Management (KA1)	1. Restore soil disturbances caused by human use (past mining, grazing, trail construction and use, camping, etc.) to soil loss tolerance levels commensurate with the natural ecological processes for the treatment area. (0184)	a. Follow procedures specified in Agricultural Handbook 537 for Utilizing the Universal Soil Loss Equation. (Cautions contained in WO 2550 letter dated 5/28/82 should be noted.) The guidance for K and T factors are in the National Soils Handbook 407.1 (a)(3)(xvii). (6159)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Soil Resource Management (KA1)		
	2. Manage designated campsites to Frissell condition class 3. (0242)	
Transportation System Management (L01 & 20)	1. Locate and design required access roads within the management area for authorized activities to minimize the biophysical and visual impact, and to facilitate restoration. (0213)	a. Roads will not be authorized: - on slopes steeper than 60%; - in areas of high erosion hazard; - in areas of high geologic hazard; - in areas of low visual absorption capacity that are unlikely for successful restoration; - in areas which would adversely effect threatened and endangered plant and animal species. (6165)
	2. Convert roads not needed for authorized activities to trails, or if they are not needed as part of the transportation system, restore them to the established VQO. (0254)	a. Maintain trails in accordance with standards in the Trail Handbook (FSH 7709.12). (6129) b. Schedule trail maintenance in accordance with Regional Acceptable Work Standards. (FSM 1310 R2 ID No. 1 7/22/82.) (6131)
	3. Construct or reconstruct trails only when needed to meet objectives of the wilderness transportation system. (0255)	a. Follow standards specified in FSH 7709.12, FSM 2323.11c and 2323.61d w/R-2 Supplement. (6134) b. Trail density may exceed two miles per square mile. Trails are constructed and maintained

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Transportation System Management (L01 & 20)		for high levels of use as specified below. (6163)

4. Construct bridges to only the standard necessary to accommodate the specified class of user. Construct bridges only where no safe opportunity exists to cross a stream or gorge during periods of normal stream flow.

A safety hazard is a physical condition of a trail which may cause injury, is unusual or unexpected, and not readily identifiable by the trail user. It is not a condition which is easily identifiable and normally encountered for the type or location of the trail involved. The following examples illustrate this distinction:

A hazard is a rotten bridge decking or handrail. A stream crossing where no bridge is provided and the user would expect this on the type and location of the trail is not a hazard.

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A hazard is a section of trail treadway supported by rotten cribbing. A section of trail where the treadway is obviously slippery is not a hazard.

A hazard is a marked ford with holes deeper than the normal channel. A deep ford with a consistent stream bed is not a hazard.
(0214)

5. Use corduroy and/or puncheon treads across bogs where no safe and feasible bypass opportunity exists.
(0215)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS & GUIDELINES
CONTINUATION OF: Transportation System Management (L01 & 20)	6. Close or sign system trails when not maintained to the safe standard for the specified use. (0216)	a. Maintain trails in accordance with standards in the Trail Handbook (FSH 7709.12). (6129)
	7. Use signs of unstained wood with routed letters and mounted on unstained posts. (0249)	a. Follow standards specified in FSH 7109.11a and 11b. (6158)
	8. Provide signs at trail terminals and trail junctions only. Include only trail identification and identification of terminal points. (0250)	
FA&O Construction Reconstruction and Maintenance (L24 AND 25)	1. Prohibit construction of new administrative facilities or structures. In the event a substantial portion of the existing administrative facility and/or structure is destroyed, it will not be replaced. (0207)	

APPENDIX C

Area Specific Implementation Program, Indian Peaks Wilderness

AREA-SPECIFIC IMPLEMENTATION PROGRAM
INDIAN PEAKS WILDERNESS

I. INTRODUCTION

This area-specific implementation program contains the specific management direction for the Indian Peaks Wilderness and prioritizes management actions. It interprets both the Forestwide direction for wilderness and the management area prescriptions in the Arapaho and Roosevelt National Forest Land and Resource Management Plan. The decisions and priorities reflected in the implementation program are based on analysis, inventories, and involvement with a wide range of public and private organizations and research conducted since the early 1970's. Documentation is contained in the "Interim Management Direction for the Indian Peaks Wilderness," approved September 9, 1979, as well as in various working papers, analyses, and studies contained in public files at the Supervisor's and District Rangers' Offices.

The implementation program reflects a substantial departure from past management of the Indian Peaks Wilderness. This change is necessitated by the continuing need to respond to the high and rapidly increasing recreational use of this attractive and readily accessible area, and the associated increase in recreation use impacts and conflicts.

The implementation program will be supplemented by an action program which will identify specific actions necessary to implement the program over the first 5-10 years of the Forest Plan. This action program will be the basis for developing the annual program of work for the Forest. The annual program of work will necessarily reflect variations from the action program based on variations in budget levels which are beyond the Forest's control.

Briefly, the implementation program is designed to achieve the following Forest Plan goals for wilderness.

--Maintain wilderness use within the capacity of the area to sustain use. This goal is addressed by priorities 1, 2, 5, 8, 10, and 14 in the implementation program.

--Prevent further decline in physical and biological resource conditions and reduce user conflicts. This goal is addressed by priorities 3, 5, 6, 7, 10, and 14 in the implementation program.

--Increase visitor awareness and improve behavior related to maintenance of wilderness values. This goal is addressed in priority 4 of the implementation program.

--Restore unacceptable physical and biological impacts of past use. This goal is addressed by priorities 9, 10, 11, 12, and 13 in the implementation program.

--Enhance social wilderness values including increased opportunities for solitude and primitive, unconfined recreation. This goal is addressed by priorities 1, 7, 8, 9, 10, and 12 of the implementation program.

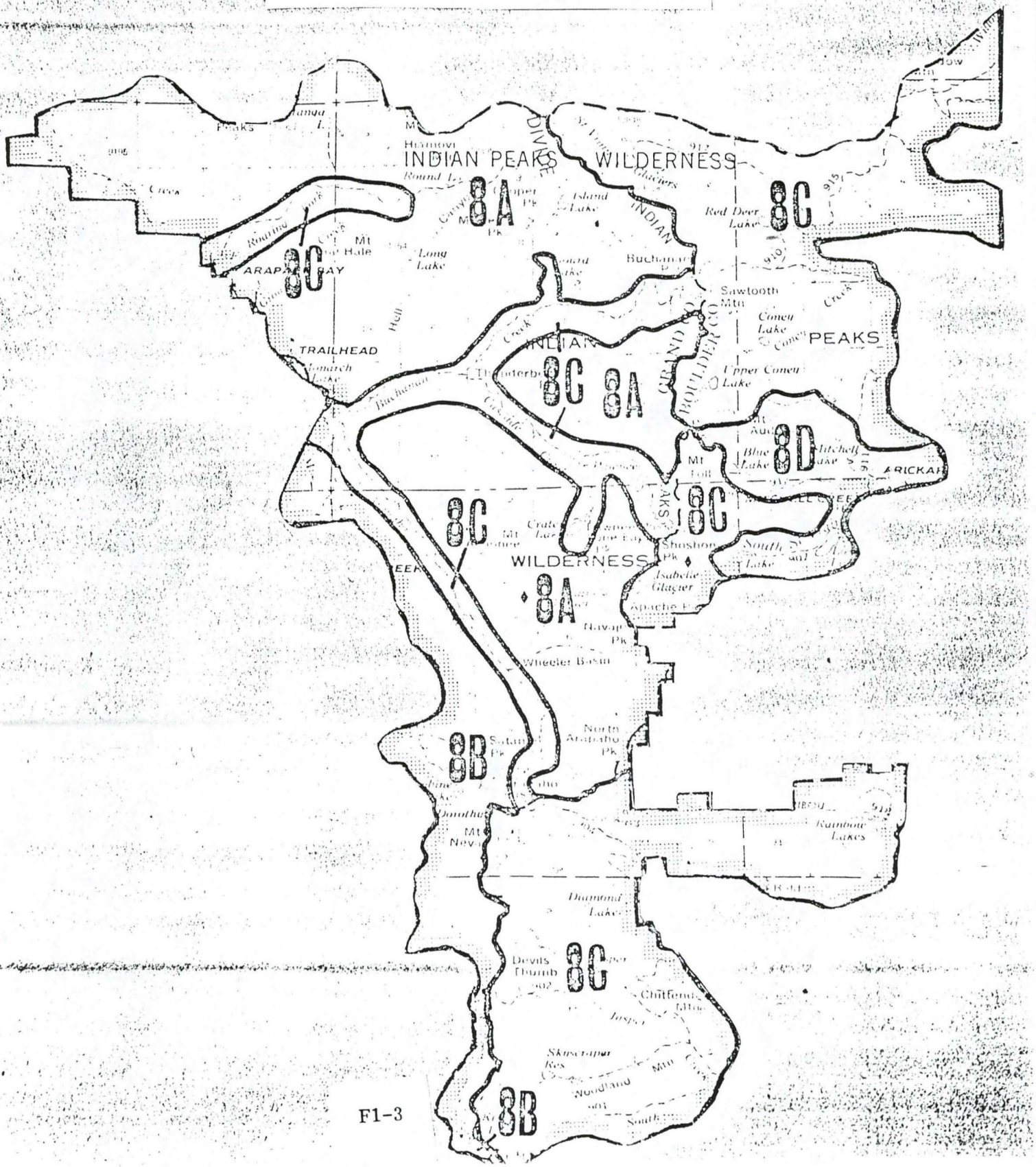
The implementation program consists of the following parts:

--A map of management areas based on the Forest Plan allocation to management prescriptions, and a description of the objectives of the allocation.

--A map and description of geographic sub-units (analysis areas) used to estimate carrying capacity and identify specific project needs.

--A summary of management direction, priorities, expected results, and major actions needed to implement the management direction.

MANAGEMENT AREA MAP
Indian Peaks Wilderness



II. DESCRIPTION OF MANAGEMENT AREA OBJECTIVES

UNIFORM FOREST MANAGEMENT PRESCRIPTION 8A
(Provides for pristine wilderness opportunities)

Management Prescription Summary

Management emphasis is for the protection and perpetuation of essentially pristine biophysical conditions and a high degree of solitude for both wildlife and humans with not perceptible evidence of past human use.

All resource management activities are integrated in such a way that evidence of current human use, including permitted and recreation livestock, is not noticeable the following season, or so that natural biological processes are not adversely or artificially changed over time by human use.

UNIFORM FOREST MANAGEMENT PRESCRIPTION 8B
(Provides for semiprimitive recreation opportunities)

Management Prescription Summary

Management emphasis is to provide for the protection and perpetuation of natural biophysical conditions. On-site regulation of recreation use is minimal. Travel is cross country or by use of a low-density constructed trail system.

UNIFORM FOREST MANAGEMENT PRESCRIPTION 8C
(Provides for semiprimitive recreation opportunities)

Management Prescription Summary

Management emphasis is to provide for the protection and perpetuation of essentially natural biophysical conditions. Solitude and a low level of encounters with other users or evidence of past use is not an essential part of the social setting. Human travel is principally on system trails. Designated campsites are used and show evidence of repeated, but acceptable, levels of use.

All resource management activities are integrated in such a way that current human use leaves only limited and site-specific evidence of their passing. Areas with evidence of unacceptable levels of past use are rehabilitated and the affected area restored. Range allotments with authorized permanent structures, and authorized mineral exploration activities requiring multi-year surface occupancy facilities may be present within the area. Scientific and other authorized practices utilizing non-motorized equipment, but requiring up to season-long occupancy are compatible.

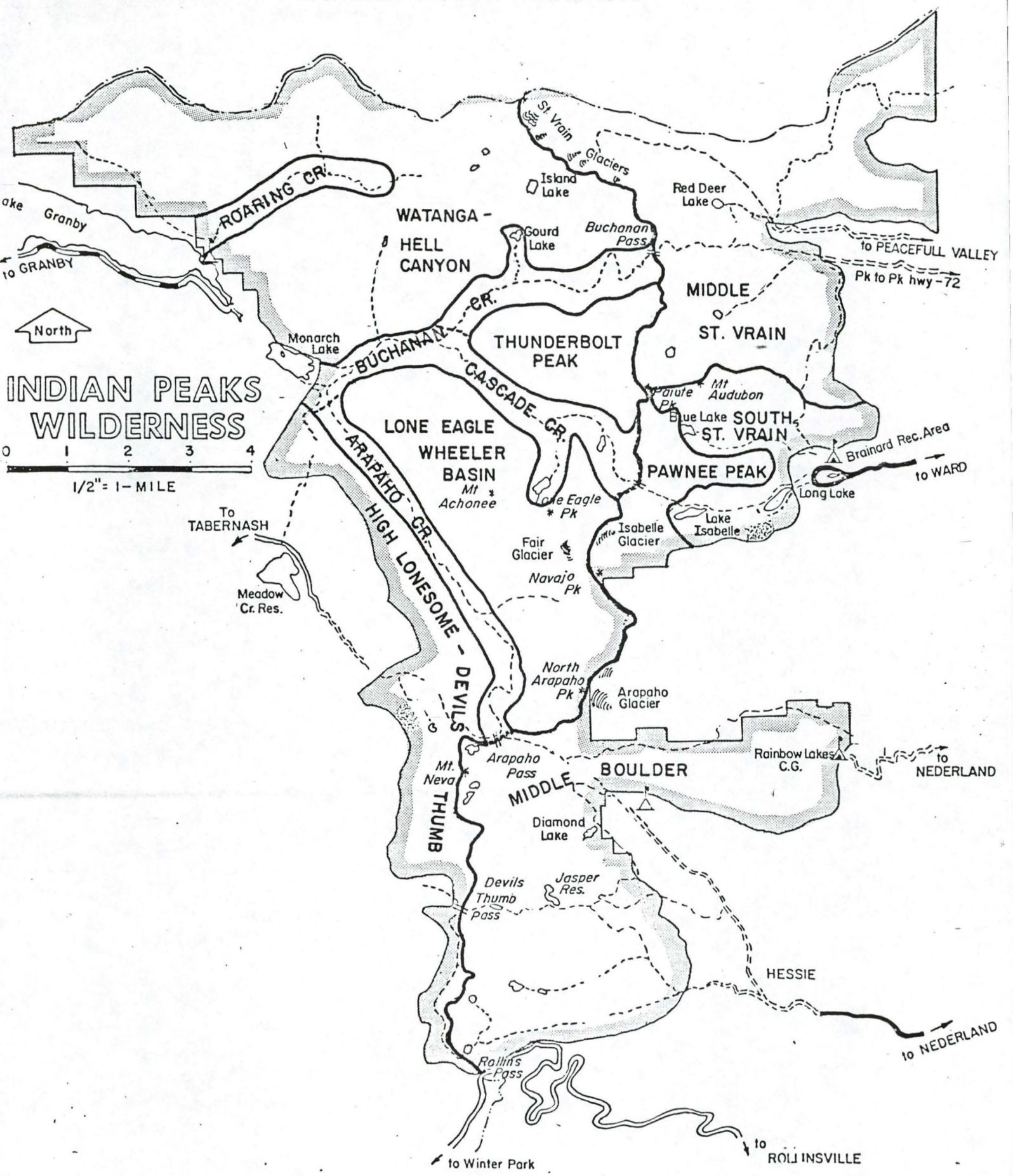
UNIFORM FOREST MANAGEMENT PRESCRIPTION 8D
(Provides for limited areas of high-density day use)

Management Prescription Summary

Management emphasis is to provide for the protection and perpetuation of essentially natural biophysical conditions inside wilderness boundaries which are adjacent to and accessed from urban or rural developments or heavily used developed recreation sites. Human use is characterized by large numbers of day-users traveling relatively short distances into the wilderness.

Management activities are integrated so that the biophysical wilderness resources are protected from unacceptable change, and day-users are made aware of the purpose of wilderness management. Management is directed towards providing a generally natural appearing setting. A trail system directs the user within the area and leads the overnight user through to other management areas. Opportunities to make official visitor contacts are frequent. There are no developed sites within the wilderness. Facilities such as bridges necessary for user safety or biophysical resource protection may be present.

ANALYSIS AREAS
Indian Peaks Wilderness



III. ANALYSIS AREA DESCRIPTION AND ESTIMATED FINITE UPPER LIMIT OF RECREATION USE

The following is a brief description of the analysis areas referred to in the implementation program. These areas are keyed to the analysis area map. As an initial step in the development of the plan, carrying capacity coefficients of the management prescriptions were applied to these analysis areas to make a rough determination of current use in respect to an estimated upper limit of use. Briefly, this process involved an analysis of the acres of various vegetative types within the area and multiplication by the appropriate coefficient. The "finite upper limit" must be adjusted through further analysis of available, suitable campsites, patterns of use, "useable" area for typical recreation activities, and general attractiveness of the area for recreation use. The initial capacity estimate indicated that use on the west side of the Continental Divide in the Indian Peaks has approximately reached capacity and that in 1982, use east of the Continental Divide exceeded capacity by at least 20 percent. Capacity is described in terms of persons at one time (PAOT) within the area.

These analysis areas are generally defined by natural topography, commonly used access points and travelways, identifiable destinations, and other characteristics that might be used in development of specific, management direction for the wilderness.

	Estimated finite upper limit of use (persons at one time)

"PRISTINE" AREA (FOREST PRESCRIPTION 8A)

This area occupies 26,390 acres west of the Continental Divide. It is divided geographically in three noncontiguous sub-units as follows:

The Watanga-Hell Canyon Unit occupies 16,190 acres north of the Cascade Creek Trail to the boundary of Rocky Mountain National Park and east to the Continental Divide.	75 PAOT
The Thunderbolt Peak Unit occupies 2,880 acres around Thunderbolt Peak between the Cascade Creek and Pawnee Pass Trail, west of the Continental Divide.	10 PAOT
The Lone Eagle-Wheeler Basin Unit occupies 7,420 acres between the Pawnee Pass Trail on the North and Arapaho Creek on the west, south through Wheeler Basin to Arapaho Pass, west of the Continental Divide.	33 PAOT
Total estimated capacity of this management area is:	108 PAOT

"PRISTINE" AREA (FOREST PRESCRIPTION 8B)

The High Lonesome-Devils Thumb Unit containing 6,390 acres along the west boundary of the wilderness from Monarch Lake south to Rollins Pass west of Arapaho Creek and the Continental Divide.	107 PAOT
Total estimated capacity of management area 8B:	107 PAOT

"SEMIPRIMITIVE" AREA (FOREST PRESCRIPTION 8C)

This management area occupies 28,970 acres comprised of all the wilderness east of the Continental Divide (except the South St. Vrain Unit) as well as 5,660 acres along the major trail corridors of Roaring Fork, Buchanan Pass-Gourd Lake, Pawnee Pass, and Arapaho Creek west of the Continental Divide, as follows:

The Middle St. Vrain Unit of 14,900 acres north of Mt. Audubon to Rocky Mountain National Park, east of the Contintental Divide.	442 PAOT
The Pawnee Peak Unit of 1,400 acres around the Isabel Glacier.	14 PAOT

The Middle Boulder Unit of 13,350 acres south of the Boulder Municipal watershed to Corona Pass east of the Continental Divide.	310 PAOT
The Roaring Fork Unit of 580 acres along the Roaring Fork Trail from Arapaho Bay to Irving Hale Divide.	38 PAOT
The west side trail corridor unit of 5,094 acres from Monarch Lake to Pawnee Pass, Buchanan Pass, and Arapaho Pass.	324 PAOT
Total estimated capacity of management area 8C:	1,231 PAOT

"DAY USE" MANAGEMENT AREA (FOREST PRESCRIPTION 8D)

The South St. Vrain unit of 1,886 acres in the South St. Vrain Drainage west of Brainard Lake, including Long Lake, Lake Isabelle, Blue Lake, and Mitchell Lake. Estimated capacity of this management area is approximately 750 persons at one time.	750 PAOT
Total estimated capacity of management area 8D:	750 PAOT
Total estimated capacity (finite upper limit) of the wilderness.	2,196 PAOT

IV. MANAGEMENT DIRECTION, EXPECTED RESULTS, AND MAJOR PLANNED ACTIONS REQUIRED

The management direction for the Indian Peaks Wilderness was prioritized by the District Rangers and the Forest Supervisor on the following basis:

1. Development of comprehensive, long-range controls over visitor use and modified management of peripheral visitor facilities would take priority over short-range solutions involving additional on-site visitor regulation and enforcement. With limited budgets, continuation of emphasis on on-site regulation and enforcement would not release the necessary funds and manpower to develop the data and skills needed to implement long-range solutions.

2. Altering the emphasis of on-site regulation to prevent further degradation of critical biophysical wilderness resources was also highly ranked, but lower in priority than achievement of comprehensive controls on use.

3. Public information, both to alter visitor behavior and to gain public acceptance of, and compliance with, comprehensive control over use was viewed as a highly important component of 1 and 2 above.

4. Management of trails consistent with management area prescriptions and user controls, management of special uses, and regulation of uses which have social but not biophysical effects were ranked lower in priority.

5. Finally, rehabilitation of impacts of past use to restore natural conditions and actions designed to increase the interplay of natural forces (fish, wildlife, fire) were acknowledged as important but unachievable until more comprehensive controls over visitor use are implemented.

These priorities generally reflect the goals in the introduction to the implementation program. In the following sections, the general management direction statement is followed by a description of how it applied to the four wilderness management areas.

SUMMARY OF MANAGEMENT AREA DIRECTION

Priority 1: Limit use within carrying capacity by implementing a permit system with entry quotas.

Application to Management Areas:

8A	8B	8C	8D
Yes	Yes	Yes	Yes

EXPECTED RESULTS:

This action might result in a reduction from current use levels by at least 20 percent east of the Continental Divide and maintenance of approximately current levels west of the Divide. The permit system will be designed to reverse currently declining resource conditions.

PLANNED ACTIONS:

The major actions required are establishment of detailed carrying capacity levels, the development of an analysis, structure, and operating plan for a permit-quota system, and the inventory analysis and development of a campsite management system. Specific steps to complete these actions will be detailed in the action program and annual work plans.

Priority 2: Design and operate trailhead facilities consistent with capacities established as part of the permit system.

Application to Management Areas:

8A	8B	8C	8D
Yes	Yes	Yes	Yes

EXPECTED RESULTS:

This activity will result in trailheads located and designed to accommodate the use desired.

PLANNED ACTION:

Study access portals to determine best design, location, and management of portal recreation developments to achieve both the wilderness objectives and to provide recreation opportunities outside wilderness. Individual access portal studies will be incorporated in the annual program of work.

Priority 3: Reduce impacts of open campfires and firewood collecting.

Application of Management Areas:

8A	8B	8C	8D
Fires generally permitted but prohibited in selected areas	Prohibit in selected areas.	Prohibit in selected areas.	Prohibit in selected areas.

EXPECTED RESULTS:

This action is expected to stabilize impacts related to open fires and fuelwood collection.

PLANNED ACTIONS:

Establish appropriate Supervisor's Orders prohibiting open campfires (chemical fuel stoves permitted) east of the Continental Divide; within one-fourth mile of Pawnee, Carger, and Caribou Lakes west of the Divide; in the alpine and krummholz ecosystems; and within 100 feet of lakes, streams, and Forest Service trails. Study potential of designating sites/areas where open campfires may be permitted following implementation of a permit system.

Priority 4. Develop and implement an information program at trailheads and major travel corridors and outside the wilderness.

Application to Management Areas:

8A	8B	8C	8D
No on-site contacts with Forest Service personnel	Few on-site contacts with Forest Service personnel	Some on-site contacts with Forest Service personnel	Some on-site contacts with Forest Service personnel

EXPECTED RESULTS:

This activity will result in an increase in visitor understanding and awareness of:

Forest Service management goals for the area based on the implementation program;

Low-impact camping techniques and improved visitor behavior;

Forest Service regulations and their purpose;

Alternative recreation opportunities outside wilderness.

PLANNED ACTIONS:

Develop an information program for the wilderness.

Expand volunteer services for information program.

Priority 5: Control camping to reduce resource impacts.

Application to Management Areas:

	8A	8B	8C	8D
Prohibit camping in management area.	No	No	No	Yes
Prohibit camping at least within 100 feet of lakes, streams, and trails.	Yes	Yes	Yes	Not applicable--camping prohibited in management area
Establish designated sites/areas as part of permit system.	Yes	Yes	Yes	Yes (camping if permitted will be only in designated sites following permit system implementation).

EXPECTED RESULTS:

The expected result is an improvement in the condition of individual campsites as they come under management as part of a planned, designated site system in areas which attract significant use based on the campsite management system developed in Activity 1.

Site use and occupancy will be managed to a level which allows meeting prescription standards for site condition.

PLANNED ACTION:

A comprehensive campsite inventory will be completed and a campsite management program developed consistent with capacity levels established in Priority 1.

In the South St. Vrain Unit, camping will be prohibited entirely, to allow resource recovery, after which sites may be designated. Other areas may be closed to camping except in designated sites.

Priority 6: Reduce recreation livestock effects on alpine, krummholz and riparian ecosystems.

Application to Management Areas:

	8A	8B	8C	8D
Prohibit recreation livestock entirely.	No	No	Prohibit in Pawnee Pass Unit above Cascade Falls	Prohibit in the South St. Vrain Unit
Prohibit overnight recreation livestock use in krummholz ecosystem.	Yes	Yes	Yes	Yes
Prohibit recreation livestock within 100 feet of lakes and streams except for watering and through travel.	Yes	Yes	Yes	Not applicable--livestock prohibited in unit
Require packed-in feed in areas where horse use is permitted but forage is not sufficient.	Yes	Yes	Yes	Not applicable

EXPECTED RESULTS:

This activity will result in a reduction of adverse biological and physical effects resulting from the tying, picketing, or otherwise confining of horses and other recreation livestock in sensitive ecosystems where pawing, compaction of soils, exposure of roots, etc., accelerates soil loss, vegetation loss, or water quality effects. It is also expected to reverse adverse trends in range condition and induce changes in species composition in areas where use exceeds capacity.

PLANNED ACTIONS:

Establish orders to effect prohibitions. Establish range capacity for areas where horse use is planned and incorporate into permit system.

Priority 7: Reduce user conflicts associated with accompanying pets (dogs), mechanical conveyances, etc.

Application to Management Areas:

	8A	8B	8C	8D
Require dogs be on maximum 6-foot leash at all times (except for permittees' working dogs and dogs used in lawful pursuit of game).	Yes	Yes	Yes	Yes
Prohibit recreation use of bicycles, carts, wagons, and other mechanical conveyances.	Yes	Yes	Yes	Yes, except handicapped use

EXPECTED RESULTS:

This activity will result in a reduction of user conflicts and perceived adverse effects on solitude, wildlife, and other values by confining dogs to a leash and prohibiting wheeled conveyances.

PLANNED ACTIONS:

Continue current Supervisor's Orders which require dogs to be on a leash and which prohibit bicycles.

Priority 8: Provide transportation system consistent with management area goals.

Application to Management Areas:

	8A	8B	8C	8D
Trails	No	Yes	Yes	Yes
Maintenance level	I	I-II	I-III	II-IV
Bridges	No	Foot/horse where hazardous	Foot/horse bridges at most crossings	High use foot bridges
Puncheon	No	Some	Yes	Yes
New construction of trails	No	No	Some	Some
Reconstruction of trails and trail facilites	No	Some	Moderate/ Extensive	Extensive
Obliteration	All	Some areas	Some areas	Some areas

EXPECTED RESULTS:

This activity will result in a diversity of wilderness opportunity ranging from cross-country travel to travel on relatively high standard trails. Existing constructed trails in the 8A management areas, including the Watanga, Hell Canyon, Wheeler Basin, and Stone Lake Trails, will be managed for obliteration. No new construction will take place in the 8A and 8B management areas. Trails in 8D will be maintained for high use including senior citizen and handicapped use where appropriate. Reconstruction in all areas will emphasize protection of soil, water, and recreation resources.

PLANNED ACTIONS:

Develop a transportation system analysis which will be the basis of decisions relating to trail construction, reconstruction needs, and abandonment needs.

Based on this transportaton system analysis, develop trail construction, reconstruction, and maintenance priorities in the action program.

Annually maintain trails to appropriate standards for the management area based on annual program of work.

Priority 9: Manage existing special uses to provide protection to surface resources.

Application to Management Areas:

	8A	8B	8C	8D
Existing water facilities	None	None	Continue to be permitted	Continue to be permitted

EXPECTED RESULTS:

This activity will result in non-conforming but accepted uses being provided for, and that surface use and occupancy will be controlled by a permit.

PLANNED ACTIONS:

Existing uses not under permit but which are to be retained will be authorized by special use permit, which will stipulate access, operations plan, etc., for the use in a manner as compatible as possible with management area direction.

Priorities for permit resolution or operating plan review to be incorporated into the annual program of work are:

Jasper Reservoir-Middle Boulder Unit
Private access road to inholdings in Middle Boulder Unit
Skyscraper Reservoir
Red Deer Lake
Lake Isabelle
Long Lake
Other existing uses

Priority 10: Manage structures and facilities, including range improvements, to meet visual objectives.

Application to Management Areas:

	8A	8B	8C	8D
Maintain existing essential range improvements.	Yes	Yes	Yes	Yes
Allow new facilities to maintain grazing capacity.	No	Yes	Yes	No
Allow new facilities to protect resource or reduce conflict.	Replacement in kind	Yes	Yes	Yes
Remove non-essential range structures, etc.	Yes	Yes	Yes	Yes
Remove aircraft wrecks when no opportunity for owner removal.	Yes, all	Yes, in visual foreground	Yes, in visual foreground	Yes, in visual foreground

EXPECTED RESULTS:

This activity will result in only structures and improvements essential for permitted use to remain or be added to retain current grazing capacity. In 8A remove all structures except essential range structures, permitted research structures, or objects of historic interest.

PLANNED ACTIONS:

The action program will establish priorities and funding requirements for:

Disposition of range structures.

Inventory and removal of other evidence of past use including aircraft wreckage.

Evaluation and disposition of possible historic structures.

Priority 11: Restore recreation use impacts

Application to Management Areas:

	8A	8B	8C	8D
Close Class III sites (except designated sites).	Yes	No	No	(Camping prohibited)
Close Class IV sites (except designated sites).	Yes	Yes	Yes	(Camping prohibited)
Close Class V sites.	Yes	Yes	Yes	(Camping prohibited)
Restore sites not meeting standard. If no or low potential for natural recovery.	Yes	Yes	Yes	Yes

EXPECTED RESULTS:

This activity will result in improvement in the biological and physical condition of areas of past heavy camping use as all class V sites which lack potential for natural recovery are rehabilitated. Class IV sites (and Class III sites in the 8A management area) that are scheduled for closure and which lack potential for natural recovery will be rehabilitated, as determined by campsite management analysis in activity 1.

PLANNED ACTIONS:

Develop a restoration program based on campsite inventory and analysis related to carrying capacity and campsite management system. This program will be included in the action program for the wilderness and will establish priorities and funding requirements.

Evaluate Lake Isabelle and Shelter Rock restoration projects to determine best restoration practices and develop restoration user's guide.

Priority 12: Fish stocking programs

Application to Management Areas.

	8A	8B	8C	8D
Consistent with International Association of Wildlife Agencies guidelines, develop fishery management objectives for the wilderness part of the overall management program.	All management areas			

EXPECTED RESULTS:

Stocking programs, where permitted based on established practice, will emphasize the restoration of self-sustaining populations of native or naturalized fish species.

Species alteration, combined with intensive fishing regulation, may be considered as part of the overall management program.

PLANNED ACTION:

Coordinate fish stocking program with Division of Wildlife to achieve management area goals.

Determine stocking needs by water body and evaluate needs against overall management of the area where the water body is located. Priority for review and evaluation of stocking programs is highest in the 8A management area.

Priority 13: Allow prescribed fire to play role in ecosystems.

Application to Management Areas:

8A	8B	8C	8D
Yes	Yes	Yes	Yes

EXPECTED RESULTS:

This activity will result in an increased opportunity to allow fires from natural ignitions to achieve wilderness objectives under prescribed conditions. A more natural fire mosaic may result.

PLANNED ACTIONS:

Conduct analysis and establish fire prescriptions for natural ignitions in the Indian Peaks.

Priority 14: Determine whether currently vacant grazing allotments will be closed, with emphasis on alpine ecosystem protection.

Application to Management Areas:

8A	8B	8C	8D
Yes	Yes	Yes	Yes

EXPECTED RESULTS:

Some or all vacant allotments will be closed to future stocking.

PLANNED ACTIONS:

Analyze vacant allotments to determine if they should be closed or retained.

APPENDIX D

Regulations specific to the Indian Peaks Wilderness Area

SUPERVISOR'S ORDER
FIRE REGULATIONS AND OCCUPANCY AND USE RESTRICTIONS

INDIAN PEAKS WILDERNESS
ARAPAHO AND ROOSEVELT NATIONAL FORESTS

PURSUANT TO TITLE 16 U.S.C. 551 AND 559 AND TITLE 36 C.F.R. 261.50, THE FOLLOWING REGULATIONS ARE ESTABLISHED WITHIN THE BOUNDARIES OF THE INDIAN PEAKS WILDERNESS AS SHOWN BELOW:

I. CAMPING

CAMPING IS PROHIBITED WITHIN 100 FEET OF ALL LAKES, STREAMS, AND DEVELOPED TRAILS; EXCEPT IN DESIGNATED AREAS AND IN OTHER AREAS AS POSTED (261.58E).

II. FIRES

BUILDING, MAINTAINING, OR USING A CAMPFIRE IS PROHIBITED WITHIN 100 FEET OF ALL LAKES, STREAMS, AND DEVELOPED TRAILS; EXCEPT IN DESIGNATED AREAS AND IN OTHER AREAS AS POSTED (261.52A).

III. DOGS

DOGS MUST BE ON A LEASH NO LONGER THAN SIX FEET ALL TIMES (261.58S).

IV. RECREATION LIVESTOCK

A. HOBBLING, TETHERING, AND PICKETING OF LIVESTOCK IS PROHIBITED WITHIN 100 FEET OF ALL LAKES, STREAMS, AND DEVELOPED TRAILS (261.58S).

B. ALL TYPES OF SADDLE, PACK, OR DRAFT ANIMALS ARE PROHIBITED ON THE FOLLOWING TRAILS (261.55c):

1. CASCADE CREEK TRAIL #1 FROM CASCADE FALLS TO CRATER LAKE AND PAWNEE PASS
2. PAWNEE PASS TRAIL #907
3. JEAN LUNNING TRAIL #901.1

V. VEHICLES

POSSESSING OR USING A BICYCLE, WAGON, CART, OR OTHER VEHICLE IS PROHIBITED (261.57H).

VI. GROUP USE

GROUPS LARGER THAN 10 PERSONS OR WITH MORE THAN 15 SADDLE, PACK, OR DRAFT ANIMALS, MUST OBTAIN A PERMIT BEFORE ENTERING THE WILDERNESS (261.57A).

THIS ORDER SUPERSEDES THAT ORDER ESTABLISHED ON MARCH 30, 1982, DONE AT FORT COLLINS, COLORADO, THIS 1st DAY OF JUNE, 1982.

Gary L Rodges

RAYMOND O. BENTON ~~for~~
FOREST SUPERVISOR

VIOLATION OF ANY OF THESE PROHIBITIONS IS PUNISHABLE BY A FINE OF NOT MORE THAN $500.00 OR IMPRISONMENT FOR NOT MORE THAN SIX MONTHS, OR BOTH (16 U.S.C. 551).

U.S. DEPARTMENT OF AGRICULTURE **SPEED-MEMO**

PART NUMBER	DATE
3	3-24-82

TO: District Ranger
Calaveras R.D.

FROM: Debbie Colston
Archaeology Tech. - S.O.

SUBJECT: Shovel Grave Compt. T:
Cultural Resource Inventory Report

MESSAGE

Attached is the cultural Resource Inventory report for the Shovel Grave Compartment. Cultural properties should be protected during timber harvest activities. Please contact the cultural resource management at the SO for needed assistance such as determining the effect of the sale on cultural properties or flagging their boundaries (ext. 317, 314).

SIGNATURE: Debbie Colston

REPLY

SIGNATURE | DATE

(DESTROY THIS PART 3 UPON RECEIPT OF REPLY)

FORM AD-311(REV. 5-68)

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PART NUMBER	DATE
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TO: District Ranger
Calaveras R.D.

FROM: Debbie Cotton
Archaeology Tech. - S.O.

SUBJECT: Shovel Grave Compt. T.
Cultural Resource Inventory Report

MESSAGE

Attached is the cultural resource inventory report for the Shovel Grave compartment. Cultural properties should be protected during timber harvest activities. Please contact the cultural resource management at the SO for needed assistance such as determining the effect of the sale on cultural properties or flagging their boundaries (ext. 317, 314).

SIGNATURE: Debbie Cotton

REPLY

SIGNATURE | DATE

(DESTROY THIS PART 3 UPON RECEIPT OF REPLY)

FORM AD-311(REV. 5-68)